MEKONG ECONOMIC RESEARCH NETWORK

Study Report on "Key Determinants Affecting Lower Middle Income Trap: Policy Recommendation for Avoiding Lower-Middle Income Trap for Lao PDR"

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Contents

List of Tables

List of Figures

Abbreviations

ADB = Asian Development Bank

ESIA = Environmental and Social Impacts Assessment

GDP = Gross Domestic Production

GNI = Gross National Income

GoL = Government of Lao PDR

LAK = Lao Kip (Lao Currency)

MoNRE = the Ministry of Natural Resource and Environment

MPI = the Ministry of Planning and Investment

NERI = the National Economic Research Institute

ODA = Official Development Assistance

OLS = Ordinary Lest Square

PPP = Purchasing Power Parities

R&D = Research and Development Bank

UNDP = United Nation Development Program

WB = World Bank

Acknowledgment

After 15 years of its implementation, the Government of Lao PDR (GoL) decided to revise the Industrialization and Modernization Strategy in order to fit it better to current situation. The GoL determined the strategy revision as one of the National Research Topics for the period 2013-2015 and assigned the Ministry of Planning and Investment to coordinate the strategy revision. The National Committee for Industrialization and Modernization Strategy Revision was established and the Committee determined 12 national research themes to support the strategy revision process. One of the themes is avoiding middle income trap.

By technical and financial support from the Mekong Economic Research Network (MERN) managed by the Centre for Analysis and Forecasting (CAF) of the Vietnam Academy of Social Sciences (VASS) with financial support from the International Development Research Centre (IDRC), Canada (project 105220), this paper provides (1) basic understanding on middle income trap; (2) deeply analysing key determinants affecting lower middle income trap; (3) identifying opportunities and challenges for Lao PDR to avoid lower middle income trap and (4) discussing on the ways how to avoid lower middle income trap for contributing to Industrialization and Modernization Strategy revision process of the Government of Lao PDR.

Despite our best efforts, research errors, collation mistakes, insufficient data and information and contested issues were unavoidable. In this regard I greatly appreciate and welcome all readers' comments and suggestions.

I would like to express my gratitude and appreciation to IDRC for its financial support, Dr. Nguyen Thang, Director of MERN, Dr. Leeber LEEBUAPAO, Lao National Coordinator of MERN for giving opportunity and for selecting this topic, Dr. Chansathith CHALEUNSINH and Ms. Nguyen Thi Thu Hang for their excellent coordination. Special

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Abstract

The middle income trap is economic stagnation, recession or slow economic growth when country reached middle income status; this causes that the transition period takes longer time. This paper states that middle income trap is caused by many factors, including: (1) failure in human resource and labor force development; (2) limited investment in R&D and thus no success in technic and technological development and creating innovation; (3) inefficient use of natural resources and (4) transparency problems in public administration.

Based on the findings, this paper argues that the Lao PDR has quite big challenges and some opportunities to avoid lower middle income trap due to many reasons. In order to increase opportunities to avoid the trap, this paper recommends the Industrialization and Modernization Strategy to focus on: (1) strengthening human resource and labor force development; (2) increasing public investment in R&D; (3) improving public administration/management system; (4) increasing efficiency and effectiveness in using natural resources and raw materials and (5) increasing global and regional integration and cooperation.

Exclusive summary

The main objective of this research paper is to provide information and policy recommendations how to avoid lower middle income trap to the Industrialization and Modernization Strategy revision process of the Government of Lao PDR, particularly it focus on: (1) improvement of understanding on middle income trap; (2) deeply analyzing key determinants affecting lower middle income trap; (3) identifying of opportunities and challenges for Lao PDR to avoid lower middle income trap and (4) discussing on the ways how to avoid lower middle income trap for contributing to Industrialization and Modernization Strategy revision process.

To achieve the goals, research team conducted many research activities, including (1) collecting and analyzing existing documents and related research publications; (2) organizing team meetings and (3) organizing consultation meeting with experts in related areas. Descriptive as well as logit and lineal regression analysis are employed.

Key findings from analysis:

(1) The middle income trap is understood as economic stagnation, recession or slow economic growth when country reached middle income status; this causes that the transition period from lower to upper middle income status or from upper to high income status takes longer. However, there is no strong scientific evidence and universally acceptable threshold how many years each country can take the transition period for avoid middle income trap or how many years each country takes the transition period in order to be identified as a country that falls in the trap. The ADB's Economic Working Paper Series No 306, dated on March 2013 reviewed transition history of many countries and determined median of the transition as middle income trap threshold. The Paper determined that the threshold for lower middle income

(2,000-7,250 PPP per capita) trap is 28 years and the same one for upper middle income (7,250-11,750 PPP) is 14 years; presenting an average PPP per capita growth rate of 4.7% and 3,5% respectively. That means country taking transition period from lower to upper middle income of longer than 28 years or having average PPP per capita growth rate of less than 4.7% during the transition period will be identified as country that falls in lower middle income trap and country taking the transition period from upper middle to high income longer than 14 years or having average PPP per capita growth rate less than 3.5% during the period will be identified as country that falls in upper middle income trap.

(2) Lower middle income trap is caused by many reasons, particularly by: (1) country's failure in human resource and labor force development; the average educational years of adults aging 15 years old and above is relatively low; causing that country is not able to convert its resources based to knowledge and technology based economy; (2) country has limited investment in R&D and thus no success in technical and technological development and in creating innovation; (3) country uses natural resources and raw materials inefficiently, ineffectively and not in sustainable manner and (4) country has transparency problems in public administration/management; corruption increase and affects efficiency and effectiveness of using public and private capitals for socio-economic development.

(3) The Lao PDR has quite big challenges to avoid lower middle income trap because of many reasons, particularly (1) the country still has limited success in labor force and human resources development; the average educational years of adults aging 15 years old and above is still very low; (2) the country still has very limited public investment in R&D; number of qualified and experiencing researchers is also still very limited; there is no strong and efficient research collaboration network and most importantly the Lao PDR is still far away from success in technical and technological development and creating innovation; (3) the using of natural resources and raw

materials is not yet very efficient, effective and sustainable and (4) the country has also transparency problems in public administration/management; the transparency index of Lao PDR is still very low (25/100 in 2014).

(4) Along with the big challenges, the Lao PDR still has some opportunities to avoid lower middle income trap due to many reasons, particularly (1) the Government of Lao PDR recognizes importance and priorities of labor force and human resource development and the Government already started to reform and increase budget allocation for the sector; (2)the Lao PDR recognizes importance and started to allocate national budget for R&D; the country has also started to develop system and mechanism for R&D to creating innovation; (3) the Government recognized dangers and damages of corruption and started to improve transparency in public administration/management by setting up institutional and legal framework; (4) the Government of Lao PDR recognized and increasingly promotes environmental protection and sustainable development and (5) the Lao PDR has been implementing "open door" and global and regional integration policies, attracting in-flow of capitals, technologies and high quality human resources, which are key determinants contributing to avoiding lower middle income trap.

(5) To increase probability of avoiding lower middle income trap for Lao PDR, this study suggest: (1) strengthening human resource and labor force development; (2) increasing public investment in R&D for developing technique and technologies and for creating innovation to increase country's ability to concert natural resources based to knowledge based economy gradually; (3) improving public administration/management system to increase transparency and thus efficiency and effectiveness in using public and private capital; (4) increasing efficiency and effectiveness in using natural resources and raw materials by strengthening environmental protection and strongly promoting sustainable development and (5) increasing global and regional integration and

cooperation with particular emphasis on human and labor force development as well as technical and technological development and transfer.

Key Determinants affecting Lower Middle Income Trap

I. Introduction

The Government of Lao PDR (GoL) approved and has been implementing the first Industrialization and Modernization Strategy since 2001. After 15 years of implementation, the revision of the Strategy is required in order to fit it better to current situation. Therefore, GoL approved the revision of the Strategy as one of the national scientific research topics for the period of 2013-2015 and appointed the Ministry of Planning and Investment (MPI) as central coordinator for the strategy revision.

To provide information and recommendations to the strategy revision process, the MPI approved 12 research topics; one of which was a study on avoiding middle income trap. The MPI appointed the National Economic Research Institute (NERI) to conduct the study.

Therefore, the main objective of this study is to provide information and recommendation to Industrialization and Modernization Strategy revision process in general. In particular, this study focus on: (1) improving understanding on middle income trap; (2) analyzing deeply causes of middle income trap; (3) identifying opportunities and challenges for Lao PDR to avoid middle income trap and (4) discussing on ways how the Lao PDR should avoid middle income trap.

To achieve the objectives, the National Economic Research Institute (NERI) has conducted following research activities:

-Collecting, studying and analyzing existing study reports and publications related to the topic. Because the middle income traps is an economic phenomenon that economist and scientist in related areas interest for. The economist and scientist have conducted number of studies and published number of papers related to the topic by supporting from many leading financial institutes like World Bank (WB), Asian Development Bank (ADB), etc. During this project implementation, the National Economic Research Institute (NERI) has collected and analyzed all study reports and publication available. Detailed tittle of all study reports and publication used for this study is provided in reference list.

-Organizing a technical consultation workshop; number of experts and technical staffs in related areas were invited to the workshop for discussing and providing commendations and suggestion for improvement of this study report.

-For identifying and quantifying determinants affecting lower middle income trap, many research methodologies were used and the results from the analysis were compared with each other in order to enhance their reliabilities. The methodologies include (1) descriptive analysis, meaning comparing socio-economic development characteristics of counties falling in lower middle income trap and countries avoiding the trap; (2) binary logit regression analysis by assuming that probability of avoiding lower middle income trap is a function of socio-economic development characteristics like human resource and labor force development, public investment in research and development (R&D), transparency in public administration, efficiency in using natural resource and raw materials, etc. (3) lineal regression analysis (OLS) by assuming that the average growth of PPP per capita is a function of socio-economic development characteristics described above.

Results from this study are expected to improve our understanding on middle income trap, particularly understanding on determinants affecting lower middle income trap. By

organizing technical consultation workshop as well as dissemination workshops and submitting this report to the committee, the National Economic Research Institute hopes fully to be able to provide useful information and evident based policy recommendations how to avoid lower middle income trap to industrialization and modernization strategy revision process of the government of Lao PDR.

This study report is divided into 5 main chapters, including (1) introduction, describing briefly on background, rational, objectives, methodologies and expected outcomes from this study; (2) understanding on middle income and middle income trap; (3) identifying and quantifying key determinants affecting lower middle income trap; (4) assessing challenge and opportunities of Lao PDR to avoiding lower middle income trap and (5) providing some policy recommendations how to avoid lower middle income trap.

However, big constrains for this study was insufficient data because this type of study needs or consumes a lot of time series data during transition period. The data include growth rate of PPP per capita, public investment in R&D, and transparency index during transition period, etc. Some of the data occurred long time ago. Therefore, they were quite difficult to find recently and actually we were not able to all data that we needed. To get sufficient data for analysis, we effort to use many methodologies and approaches to reconstruct missing ones based on data available to minimize biasness. For example, to identify and quantify key determinants affecting lower middle income trap we need the average rate of public investment in R&D to GDP of each country during transition period; to estimate the rate we need the rate of public investment of each country in each year during transition period. However, in practice, we were not able to find any one that we need. Therefore, in this case, we used the average value of the two numbers standing before and after the missing one to fill the missing one. If the same number provided by different sources is different; we consider and use the one having

most consistency with other numbers. Considering and reconstructing the missing number could be incorrect and affect study results to some certain level.

II. Understanding on Middle Income and Middle Income Trap

2.1. Understanding on Middle Income

To understand meaning and cause of “middle income trap”, knowledge or understanding on middle income is necessary. Without clear understanding or knowledge on middle income, meaning of middle income trap and its causes will be not understandable. However, there is no strong scientifically evidenced and universally acceptable definition of middle income. Based on finding from literature review, middle income or middle income country is a country classification of world leading financial institutes based on their economic performance or income status for facilitating consideration of credit provision or provision of other financial and technical assistants. Therefore, most of world leading financial institutes have standards, criteria or classification methodology of their own such as:

-World Bank (WB): classifies countries in 4 different groups based on GNI per capita at 1990 constant price and updated the classification criteria by using “international inflation rate”. In 2010, the WB classified countries with GNI per capita of less than USD 1,005 as low income or poor country; countries with GNI per capita of between USD 1,006 and USD 3,975 as lower middle income countries; countries with GNI per capita of between USD 3,976 and 12,275 as upper middle income countries; and countries with GNI per capita of higher than USD 12,275 as high income or rich countries.

However, classification of WB may have many constrains and is criticized by many economist and analysis in related areas; particularly the value of USD used as standard

for classification is different in each country. The economists and analysis argued that USD 1 can buy many things in low income or poor country while the same amount of USD is not able to buy the same things in high income or rich country. Therefore, the use of USD as standard or criteria would be not able to reflect real economic performance and income status of each country perfectly.

-Asian Development Bank (ADB): classifies countries in 4 different groups based on Purchasing Power Parities (PPP) at 1990 constant price and updated the classification criteria by using "international inflation rate" similarly as WB. According the ADB' classification criteria in 2010, low income or poor countries are countries having PPP per capita of less than 2,000; lower middle income countries are the countries having PPP per capita of between 2,001 and 7,250; upper middle income countries are the countries having PPP per capita of between 7,251 and 11,750 and high income or rich countries are the ones having PPP per capita of over 11,750.

Because of using different standards or criteria for measurement and classification, WB and ADB have different list and number of countries in each group. In 2010, of the same 124 countries that data were available, there were 29 low income countries; 39 lower middle income countries, 30 upper middle income countries and 26 high income countries according to WB's classification; while there were 40 low income countries; 38 lower middle income countries; 14 upper middle income countries and 32 high income countries according to ADB' classification, as presented in the table below:

Table 1: Number of low, lower middle, upper middle and high income countries by World Bank and ADB classification

Country groups	ADB classification	WB classification
Low income countries	40	29
Lower middle income countries	38	39
Upper middle income countries	14	30
High income countries	32	26

Source: ADB working paper, No 306, March 2012

The list of these countries is attached in the annex 1. Results of comparison between ADB and WB classification reflect that world leading financial institute use significantly different standards or criteria for classification. According to ABD's classification, the number of low income countries is higher in comparison with to the same one of WB; indicating that ADB criteria for entering into lower middle income countries is stronger and thus it is more difficult to enter in comparison with WB's criteria. For example, Lao PDR is still classified as low income or poor country according to ADB's criteria while the country was classified as lower middle income country by WB's criteria by 2010. However, the number of countries remaining in the list of middle income countries according to WB's classification is bigger than the same one of ADB and the number of high income countries according to ADB's classification is bigger than the same one of WB; this indicates that the transition from middle to high income status according to WB's standards or criteria would be more difficult in comparison with the same one of ADB.

2.2. Meaning of Middle Income Trap

In sub-section above, we tried to find out the meaning or definition of middle income. According to findings in the sub-section above, there is no strong scientific evidenced

and universal acceptable definition or understanding on middle income. Middle income is classification of world leading financial institutes for facilitating their consideration on credit provision as well as provision of other financial and technical assistance. There are two level of middle income, i.e. lower and upper middle income.

In this sub-section, we would like to go on one step ahead to discuss on understanding or meaning or definition of "middle income trap". Based on finding from literature review, there are many papers providing discussion and perspectives on "middle income trap". The most recent of these papers include ADB's Working Paper Series No. 306 (2012), paper on policy review on middle income trap in Asian (2012), paper on developing countries and middle income trap (2012), etc.

Based on our findings from literature review, the term "middle income traps" is composed of the term "trap" and the term "middle income". Regularly or normally, the term "trap" is understood as tool that hunter usually uses to catch wild animals. Wild animal falling in a trap will be not able to move freely and the term "middle income" is country classification of some world leading financial institutes based on economic performance or income status for facilitating their credit provision or provision of other technical and financial assistance, as described in the sub-section above.

Hence, the term "middle income trap" is regularly or normally understood as economic stagnation, recession or slow economic growth when country reached middle income status. The economic stagnation, recession or slow economic growth causes that transition period from middle to high income status takes longer time. Because of having two level of middle income there are two type of middle income trap, i.e. lower and upper middle income trap. However, there are no strong scientific evidenced and universal acceptable thresholds how long a country can stay in the status without to fall in the trap. In other words, how long should the transition period take in order to identify that a country falls in middle income trap or that a country can avoid the trap.

The most recent discussion on the question is provided in ADB Economic Working Paper No 306, dated on March 2012. The paper reviewed transition history of countries around the world and find 9 countries reached lower middle income status after 1950 and were able to transit to upper middle income status and 23 countries transited to high income status during the same period. According to findings of the paper, the shortest transition period from lower to upper middle income status was about 17 years, i.e. the transition period of China and the longest one was 54 years, i.e. the transition period of Costa Rica and the shortest transition period from upper middle to high income status was 7 years, i.e. the transition period of Honkong, South-Korea and Taiwan and the longest one was 40 years, i.e. the transition period of Argentina.

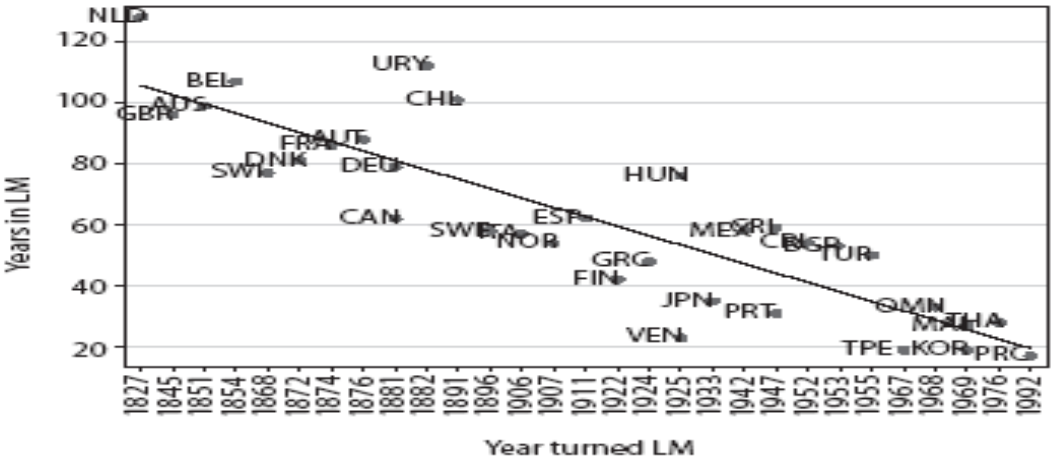
Based on the findings, the paper suggested determining the threshold for middle income trap by using media of transition period of these countries. According to the suggestion, the threshold for lower middle income trap would be 28 years (the transition period of Thailand) and the threshold for upper middle income trap would be 14 years (the transition period of Norway), meaning countries having transition period from lower to upper middle income status longer than 28 years would be identified as countries falling in lower middle income trap and countries having transition period from upper middle to high income status longer 14 years would be identified as counties falling in upper middle income trap. More details on transiting countries after 1950 are provided in the annex 2 and 3.

Based on the threshold and ADB's definition on middle income, the average PPP per capita growth during the whole transition period is estimated to be about 4.7% in order to avoid lower middle income trap and 3.5% in order to avoid upper middle income trap. Giving average population growth of 2.1% like Lao PDR, country needs average economic growth rate of 6.8% for avoiding lower middle income trap and 5.7% for avoiding upper middle income trap. Based on the finding from the estimation, the

avoiding middle income trap requires not very high economic growth rate; but it requires much more continuing or sustaining growth for relatively long period.

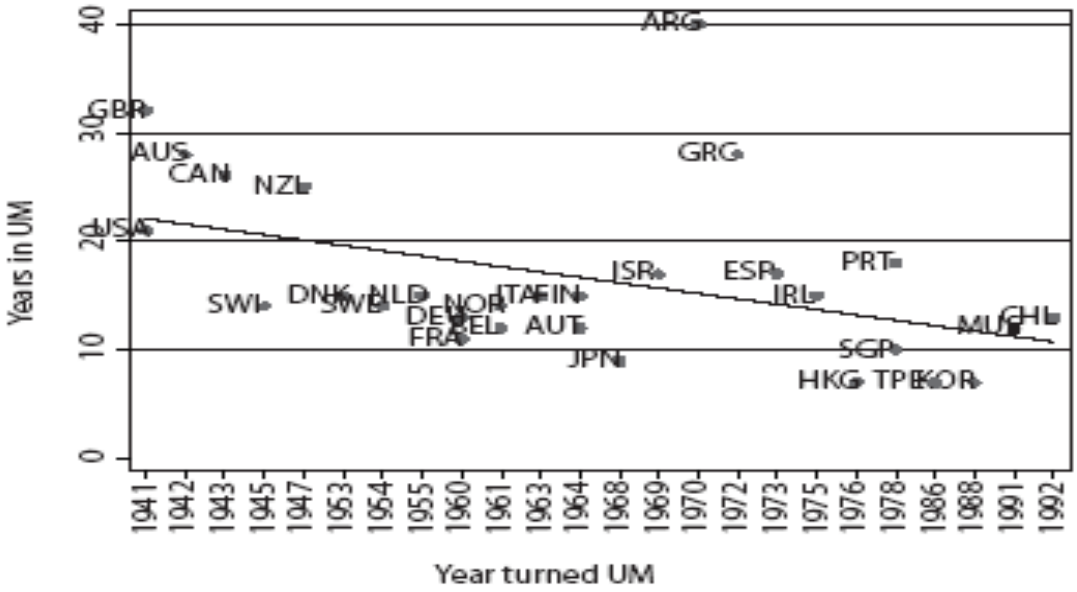
However, the Working Paper doesn't explain clearly why to use median and why not other statistical mean like arithmetic mean, geometric mean, mode, etc. Instead doing that, the Paper goes on analyzing correlation among entry time and transition period and fund significant correlation among both. According to the finding, the country entering into lower middle income status 1 year earlier would stay in the state 0.6 year longer (figure 1) and the countries entering into upper middle income status 1 year earlier would stay in status 0.24 year longer (figure 2).

Figure 1: Correlation among entry time and transition period from lower to upper middle income status



Source: ADB economic working paper No. 306, March 2012

Figure 2: Correlation among entry time and transition period from upper middle to high income status



Source: ADB Economic Working Paper No. 306, March 2012

The findings indicates that the threshold of avoiding middle income trap will be shorter in long term period because of technological and technological development and advantage; meaning the transition period required for avoiding middle income trap will be shorter or the average economic growth required for avoiding middle income trap will be higher. However, short termly, this doesn't mean that the transition period required for avoiding middle income trap will be shorter constantly and automatically. Basically or principally, this depends much more on the transition period of new transiting country. However, the Paper does not discuss and provide any details how the threshold will be changed in the next 10 or 15 years. Due to many reasons, we are also not able to do so. Our main objectives in this small assignment is also not really to estimate the change of the threshold, but to find out and quantify key determinants affecting probability of avoiding lower middle income trap. Therefore, we left this question her.

2.3. List of Countries in and out of Middle Income Trap in 2010

Using the threshold, the ABD' Working Paper identified that 30 countries were in lower middle income trap and 5 countries were in upper middle income trap in 2010. Of which, the biggest share are in Latin America region (21 countries) and Africa (6 countries); followed by Middle-East (5 countries) and Asian (3 countries). More details on countries remaining in lower and upper middle income trap is attached in the annex 4

Based on the thresholds described above, 8 lower middle income countries and 9 upper middle income countries are still in transition period and thus they are not yet able to be identified clearly whether they will be able to avoid middle income trap or they will fall in the trap. These lower middle income countries are (1) Cambodia; (2) India; (3) Indonesia; (4) Myanmar; (5) Pakistan; (6) Honduras; (7) Vietnam and (8) Mozambique. These upper middle income countries are (1) China; (2) Thailand; (3) Bulgaria; (4) Hungary; (5) Poland; (6) Turkey; (7) Costa Rica; (8) Mexico and (9) Oman. The list of these countries is attached in the annex 5.

As described above, it is not yet clear whether countries in transition period from lower to upper middle income less 28 year and the countries in transition period from upper middle to high income status less 14 will be able to avoid middle income trap or they will fall in the trap. However, many of these lower middle income countries such as Indonesia, Pakistan and Honduras had relatively low average economic growth rate during the period from 2000-2010, i.e. 3.9%, 2.6% and 1.6% respectively. Therefore, these countries have high risk to fall in lower middle income trap. Similarly, many of upper middle income countries such as Hungary, Turkey, Mexico and Oman had also average PPP per capita growth rate below 3.5% and thus these countries have also high risk to fall into upper middle income trap. At the same time, many of lower income

countries like Cambodia, India, Myanmar, Vietnam and Mozambique have average PPP per capita higher than 4.7% and some of upper middle income countries like China, Thailand, Bulgaria and Poland have average PPP per capita growth rate higher than 3.5% during 2000-2010; thus these countries have good opportunity to avoid middle income trap.

III. Key Determinants Affecting Lower Middle Income Trap

In the section above, we provided general overview and understanding on middle income and middle income trap. However, the most important objectives of this research assignment are to find out key determinants affecting middle income trap and based on findings from the analysis, we should have to formulate or provide policy recommendations how the Lao PDR can and should avoid middle income trap to the Industrialization and Modernization Revision Committee. Therefore, we would like to go on focusing the issues in this section.

However, based on findings in the section above, there are many constrains for identifying and quantifying key determinants affecting middle income trap, particularly there are no the strong scientific evidenced and universally acceptable definition of middle income and middle income trap threshold. The lack of the strong scientific evidenced and universally or generally acceptable definition and thresholds would make identifying and quantifying key determinants affecting middle income trap difficult and universally acceptable.

However, to make this analysis possible, we would like to use definition and threshold suggested in ADB's Economic Working Paper Series No. 306, namely we will identify countries having transition period from lower to upper middle income status longer than 28 years as countries falling in lower middle income trap and countries taking the

transition period from upper middle to high income status as countries falling in upper middle income trap. We drop all countries that are still in transition period and not yet able to be identified clearly whether they will be able to avoid middle income trap or they will fall in the trap such as Vietnam, Cambodia, etc. to avoid biasness.

Furthermore, we would like just focus on identifying and quantifying key determinants affecting lower middle income trap only due to many reasons, particularly data constrains, as well as time and personal resource constrains and urgent needs of policy makers (the Industrialization and Modernization Strategy Revision Committee). We drop identifying and quantifying key determinants affecting upper middle income trap first.

By trying hard and best of our efforts, we got 60 countries whose data on socio-economic development during transition period are available. Of which, 21 countries took transition period of 28 years or less and thus the countries are identified as countries of avoiding lower middle income trap and the remaining 39 countries took transition period of longer than 28 years and thus the countries are identified as countries of falling in lower middle income trap.

In order to make findings more reliable, we will use many approaches, particularly (1) descriptive analysis; (2) binary probit regression analysis and (3) multivariable lineal regression analysis by assumption that avoiding lower middle income trap is a function of socio-economic development characteristics like human resource development, public investment in R&D, efficiency and effectively use of natural resources, transparency in public administration, etc. as below:

- **Descriptive analysis:**

This tries to divide countries into two groups based on lower middle income trap threshold described above; meaning into countries group having transition period of equal to or less than 28 years and countries group having transition period of longer than 28 years. This method tries easily to compare the socio-economic development indicators of both countries group during their transition period such as: human

resource development, public investment in research and development (R&D), social equality, risk to natural disasters, efficiency and effectiveness of using nature resources and raw materials, transparency in public administration, etc.

However, most important questions that we have to explain are the ones related to measurement of the socio-economic development characteristics, meaning we have to answer and explain the questions, including: How can the characteristics of socio-economic development be measured? Which indicators indicate the characteristics? Where do we able to the indicators? etc.

During this project implementation, we tried to answer the questions by using participatory approaches, meaning by discussing among our team and also with external experts. Based on findings from discussions, we would like to use following indicators or measurement to measure the socio-economic development characteristics:

- ***Human resource development:*** there are many appropriate indicators or measurements for measuring human resource development. The indicators or measurements include, for example, the public investment in education sector, literature rate adults aging 15 years old and above, proportion of population completing high educational level, average educational year of adults aging 15 years and above, etc. However, based results from many discussions and availability of data, we decided to use the last indicators (the average educational years of adults aging 15 years and above) in this analysis. And based on characteristics how the indicator affects socio-economic development, particularly economic growth and income generation, we would like to use the indicator at the time of transition for countries already transited to upper middle income status and at recent time (2010) for countries remaining in middle income trap. As aware, it needs a long time to increase the average educational years of adults aging 15 years old and above; however, the increasing the average educational years of adults would affect economic growth and income generation immediately.

- ***Social equality:*** is relatively broad and has many dimensions. However, based on findings from many studies and discussion among our team, income dimension is very important and has significant correlation to many other dimensions such as access to education and health services, etc. GINI coefficient is usually used to measure or indicate income inequality. Therefore, we decided to the indicator to indicate or measure social inequality in this study. Similarly as average education years of adults aging 15 years and above, it needs longer time to improve GINI-coefficient. However, the coefficient would have immediate effects on economic growth and income generation activities. Therefore, we would like use the indicator at the time of transition for countries already transited to upper middle income status and recent time (2010) for countries remaining in lower middle income trap.

- ***Public investment in research and development (R&D):*** based on findings from discussion among our team and with many experts, the proportion of public investment in R&D to GDP would be a suitable indicator, indicating or measuring public investment in R&D. However, public investment in R&D would have no or very limited immediate effects on socio-economic development. Public investment in R&D would have long term effects and depends highly on continuity and sustaining of the investment. High public investment ratio in R&D just only short term period or just only in particular year would have not much effects on socio-economic development. Therefore, we would like to employ the average indicator during whole transition period for countries already transited to upper middle income status and the average indicator from the year of entering into lower middle income status until recent time (2010) for countries remaining in lower middle income trap.

- ***Risk to natural disaster:*** is constant and depends much more on geographical location. The UNDP classified natural hazard risks into 4 different levels. The level 4 is for highest risk; followed by 3, 2 and 1 respectively. The level 1 is for lowest risk country. We will employ the natural disaster risk index in this analysis.

- ***Efficiency and effectiveness of using natural resources and raw materials:*** it is quite difficult to find appropriate indicator indicating efficient and effective use of natural resources and raw materials. However, based on results from discussion among our team and with many experts as well as availability of data, we decided to employ the ratio of exporting natural resources and materials to total export in this analysis; meaning higher ratio indicates lower efficiency and effectiveness. The long term export ration will be able to reflect real situation of using natural resource and raw materials better than the short term one. Therefore, we would like to employ the average ratio during whole transition period for transited countries and from the years of entering into lower middle income status until recent year (2010) for counties remaining in lower middle income trap, similarly as public investment in R&D.

- ***Transparency in public administration/management:*** is assumed as an important socio-economic development characteristic affecting lower middle income trap. However, it is quite difficult to find appropriate indicator for indicating the transparency in public administration/management. However, based on results from long discussion and due to lacking of better indicator, we decided to employ transparency index generated by "Transparency International" even though the employment of the index has many contains, particularly the index come from perception survey and is just available systematically since 1990. The index before 1990 is difficult to find. Similarly as public investment in R&D and efficient use of natural resources and raw materials, the effects of transparency in public administration/management on socio-economic depends highly on its continuity in long term period. The increasing transparency index just only in short term period and in particular year would have not much effect on socio-economic development. Therefore, we would like to employ the average index during transition period for transited countries and from the year of entering into lower middle income status until recent year (2010).

We will identify key determinants affecting lower middle income trap by comparing the average indexes of both countries groups, i.e. countries of falling in lower middle income trap and countries of avoiding the trap as below:

$$\bar{X} = \frac{\sum x_i}{n}$$

Whereby:

$$\bar{X} = Average\ index\ of\ countries\ group$$
$$x_i = Indicators\ or\ average\ index\ of\ individual\ country$$
$$n = Nunber\ of\ country\ in\ the\ group$$

The table below presents the results from comparison:

Table 2: Results from comparison of socio-economic development characteristic of countries group of avoiding middle income trap and countries group of falling into lower middle income trap

Characteristics of socio-economic development	**Indicators/measurement**	**Countries of avoiding lower middle income trap**	**Countries of falling in lower middle income trap**
Human resource development	Average educational years of adults aging 15 years old and above (years)	8.6	5.9
Public investment in R&D	Average percentage of public investment in R&D (%)	1.8	0.4
Social inequality	GINI-coefficient	34.7	44.8
Risk to natural disaster	Hazard index	2.2	2.1

Efficiency and effectiveness of natural resources and raw materials	Average ratio of exporting natural resource and raw material in total export (%)	4.7	9.5
Transparency in public administration/management	Average transparency index	68.9	37.4

Source: Estimated by research team

The results of descriptive analysis in the table able indicate clearly that countries of avoiding lower middle income trap has higher number of educational years of adults aging 15 years old and above, higher ratio of public investment in R&D, higher transparency index and lower GINI-coefficient, lower ratio of exporting natural resources and raw materials. The results from the descriptive analysis states or clarifies correlation among the characteristics of socio-economic development and lower middle income trap to some certain level.

However, the results do not indicate many important things very clearly, particularly they do not provide significant test and thus we are not able to know surely whether the difference in socio-economic development characteristics among both countries groups is statistically significant at conventional level (at least 90%) or not, the results do also not indicate very clearly how (increasing or declining) and how much (how many percent) the probability of avoiding lower middle income trap is expected to change by changing of the socio-economic development characteristics of one unit. For example, the results do not indicate very clearly how and how much the probability of avoiding lower middle income trap is expected to change by increasing the average educational year of adults aging 15 years old and above every one year or the average ratio of public

investment in R&D to GDP every one percent, etc. Therefore, we would like to go on examine the results from descriptive analysis by using binary probit regression.

- **Binary probit regression analysis:**

As described above, the results from descriptive analysis are not able to indicate many important things; particularly the results are not able to provide correlation or elasticity among probability of avoiding lower middle income trap and the change in characteristics of socio-economic development, meaning to estimate the proportion of change in probability of avoiding lower middle income trap to the change in socio-economic development characteristics. The correlation or elasticity is very important for socio-economic development to avoid lower middle income trap. Therefore, we would like to go on examining the results by using regression analysis.

Usually, the logit or probit regression analysis is suitable for such type of analysis. According to Green, both models give very similar results. However, the difference between both is located in the assumption of error term. However, according to discussion with some econometric experts, logit regression has one important advantage for most applications in social sciences over probit and that is yield "odd ratios" which are relatively easy to interpret and communicate. Probit gression coefficient do not have as simple an interpretation beyond positive means increase, negative decrease, without doing a bit more work with the standardization scores. In technical terms for quality of fit in multivariate dataset there is some modest difference in performance. logit model is more robust give better fits with more extreme predictor variable; whereas probit model does better when all predictors are "well behaved".[1]

Based on results from discussion, we would like to employ logit regression in this study. In the theory of the regression analysis, the dependent variable or function y is assumed as a function of independent variable x_i and an error term ε for all observation up to n (Nelson 1974, Maddala 1999).

[1] Prof. Dr. Louise Label, Director of Social and Environmental Research Unit of Chieng Mai University of Thailand.

$$Y = \begin{cases} 1 & \text{if } Y_i^* = X_i\beta + \varepsilon_i > 0 \\ 0 & \text{if } Y_i^* \leq 0 \end{cases} \quad ; j = 1, \dots \dots, J$$

The response probability that dependent variable or function y depends on the parameters β which describe as impacts of x_i on y, and the covariance of error term ε (Erich Schmidt and Hermann Waibel: Greene 2003, Pindck and Rubinfeld 1998). For binary logit regression, the function from assumes a cumulative normal distribution for the error terms.

$$\Pr(Y_{ij} = 1 | X_i) = \left[1 + e^{-x'\beta}\right]^{-1}$$

Estimation of binary logit regression is based on maximum likehood method and the log-likelihood function for sample of *n* observations

$$logL = \sum_{y_i=0}^{n} w_i \log[1 - \Phi(\beta' X_i)] + \sum_{y_i=1}^{n} w_i \log\Phi(\beta' X_i)$$

Where w_i is a sample weight for observation $i = 1, \dots \dots, n$. The explanatory variables x_i are expected to affect probability function y_i by some direction/way (positive or negative).

Based on theoretical background of logit regression analysis, we are able to develop "Avoiding Lower Middle Income Trap Model" by assuming that probability of avoiding lower middle income trap (dependent variable y) is a function of socio-economic development characteristics (independent variable x_i) as such: human resource development (x_1), public investment in R&D (x_2), social inequality (x_3), risk to natural disaster (x_4), transparency in public administration/management (x_5). The "Avoiding Lower Middle Income Function (y)" can be described as below:

$$Y = \begin{cases} 1(avoiding\ lower\ middle\ income\ trap) & \text{if } Y_i^* = X_i\beta + \varepsilon_i > 0 \\ 0\ (falling\ in\ lower\ middle\ income\ trap) & \text{if } Y_i^* \leq 0 \end{cases} \quad ; j = 1, \dots, J$$

We can create independent variable x_i based on socio-economic development characteristics as below:

Table 3: Socio-economic development characteristics (independent variable x_i), their measurement and expected impacts direction on avoiding lower middle income trap (function y)

Socio-economic development characteristics (x_i)	Indicators and measurements	Variable types	Expected impacts on avoiding lower middle income trap (y)
Human resource development	Average educational year of adults aging 15 years old and above	Continues	+
Public investment in R&D	Average ratio of public investment in R&D to GDP during transition period	Continues	+
Social inequalities	GINI-Coefficient	Continues	-
Risk to natural disasters	Hazard index	Continues	-
Efficiency and effectiveness of using natural resource and raw materials	Average ratio of export of natural resources and raw materials to tall export	Continues	-
Transparency in public admiration/management	Average transparency index/score	Continues	+

Source: Estimated by research team based on data from several sources

The results from logit regression analysis indicates that human resource development, public investment in R&D, efficiently use of natural resources and raw materials and transparency in public administration has positive impacts on avoiding lower middle income trap at statistically significant level; meaning the increasing average number of educational year of adults aging 15 years old and above, ratio of public investment in R&D, declining percentage of export of natural resources and raw materials to total export and increasing transparency index will increase probability of avoiding lower middle income trap.

Table 4: Key determinants affecting lower middle income trap (results from binary probit regression analysis)

Determinants	Coefficients	Str.Err	Z	P>|Z|
Human resource development	0.5297231	0.2921838	1.81	0.070
Public investment in R&D	1.925502	1.133829	1.70	0.089
Inequality	-0.0671622	0.0650035	-1.03	0.302
Risk to natural disaster	0.7784583	0.5382961	1.45	0.148
Inefficiency and ineffectiveness of using natural resource and raw materials	-0.0024127	0.0317642	-1.66	0.089
Transparency in public administration	0.0539833	0.0327283	1.65	0.099

Observation: 60; LR Chi2(60)=60,41; Prob>chi2=0,000; Pseudo R2=0,7776

The observation in many countries of avoiding lower middle income trap such as South-Korea, Singapore, Taiwan and Hong Kong stated the analytical findings. These countries have relatively good educational system; their population has good access to educational services and consequently these countries have relatively high educational year of adults aging 15 years old and above. These countries invest also a lot of public money in R&D generate a lot of technical and technological innovation. Due to success

in human resource development and development in techniques and technologies, these countries have success in converting their economy to knowledge and technology based one.

Social inequality has negative impacts on avoiding lower middle income trap. However, the impacts are not statistically significant at conventional level, i.e. 90%. This could be due to high distribution and small sample size. An unexpected result from the analysis is the impact of hazard index; although the index has no impact on avoiding lower middle income trap at statistically significant level. The results from the analysis shows positive impact of the hazard index on avoiding lower middle income trap; meaning the probability of avoiding lower middle income trap will increase along with increasing risk to natural disasters. The possible reasons for explanation would be that the risks are important determinants affecting countries' efforts to investment in techniques, technologies and in human resources development for overcoming and adapting to natural disaster. Hence, the risks to natural disasters strengthen countries' capacity to avoiding lower middle income trap. The cases of Japan and South-Korea, etc. state the analytical findings. Opposite to this, countries with low risk and abundance with natural resources have less incentive and enforcing power for development of human resources and technologies and hence many of these countries fall in lower middle income trap.

However, the coefficient β_i of independent variable x_i of binary logit regression just indicates impact direction of x_i on function y (positive or negative); but the coefficient do not quantity of the impacts. From the efficient, we are not able to know surely how much (how many percent) probability of avoiding lower middle income trap is expected to change by changing socio-economic development characteristics. For example, the coefficient β_1 of human resource development x_1 in the model above indicates just only that the probability of avoiding lower middle income trap is expected to increase by increasing average educational year of adults aging 15 years old and above; but the

coefficient does not indicate clearly how many percent the probability is expected to increase by increasing average educational year of adults aging 15 years old and above one year.

To estimate elasticity of probability to avoid lower middle income trap to the change of socio-economic development characteristics, the marginal effect coefficient after logit regression needs to be estimated. The marginal effect coefficient of an explanatory variable x_i is effect of an unit change of this variable on probability function y, given that all other explanatory variable constant:

$$\frac{\partial P(y_i = 1|X_i)}{\partial X_i} = \frac{\partial E(y_i|X_i)}{\partial X_i} = \varphi(X_i'\beta)\beta$$

The slop parameter of linear regression model measures directly the marginal effects of explanatory variable x_i on function y. The marginal effect depend on the value of explanatory variable x_i. Therefore, there exists an individual marginal effect for each variable. Hence, the average coefficient of marginal effect of continues variable as we have in "Avoiding Lower Middle Income Trap Model" above is:

$$AME = \frac{1}{n}\sum_{i=1}^{n} \varphi(x_i'\beta)\beta$$

- For dummy variable:

$$AME = \sum_{i=1}^{n} \left[\Phi\left(x_i'\beta \middle| x_i^k = 1\right) - \Phi(x_i'\beta | x_i^k = 0\right]$$

The interpretation of average marginal coefficient after logit regression depends on variable type. For continues variable, an infinitesimal change of the independent variable x_i changes the probability that dependent variable y takes the value one by X%. For dummy variable, the change of independent variable x_i from zero to one changes

the probability that the dependent variable y takes the value one by X percent point (ppt).

The marginal effect coefficient after Avoiding Lower Middle Income Trap Model above indicates that public investment in R&D has strongest effect on avoiding lower middle income trap. According to the results, the increase in average ratio of public investment to GDP during transition every one percent will increase probability of avoiding lower middle income trap of 74.7%; followed by human resource development; according to finding from the analysis, the increase in average educational year of adult aging 15 years old and above every one year will increase probability of avoiding lower middle income trap 20.5% and the increasing in transparency index every 1 score will increase probability of avoiding lower middle income trap 2%. The table below presents more details on findings from analysis.

Table 5: Marginal effect coefficient after avoiding lower middle income trap

Determinants	dy/dx	Str.Err	Z	P>|Z|
Human resource development	0.2057557	0.12054	1.71	0.088
Public investment in R&D	0.747906	0.5192	1.44	0.150
Social inequality	-0.0260872	0.02474	-1.05	0.292
Risks to natural disasters	0,3023698	0.19906	1.52	0.129
Inefficiency and ineffectiveness of using natural resources and raw materials	-0.0009371	0.01236	-1.66	0.089
Transparency in public administration	0.0209683	0.01343	1.65	0.099

- **Lineal regression analysis/OLS**

The results from descriptive analysis and binary logit regression above indicate that human resource development, public investment R&D, efficiently use of natural

resources and raw materials and transparency in public administration/management has significant effects on avoiding lower middle income trap. In this sub-section, we would like to go on examining the results by lineal regression analysis; whereby we would like to assume the average growth rate of PPP per capita during transition period is a function of socio-economic development characteristics like human resource development, public investment in R&D, efficiently use of natural resources and raw materials, transparency in public administration, etc. as presented in the function below:

$$Y = C + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \varepsilon$$

Whereby:

$Y =$ Average growth rate of PPP per capita during transition period

$C =$ Constant term

$\beta_{\mathrm{i}} =$ Coefficient of independent variable

$x_1 =$ Human resource development (average number of educational year of adults aging 15 years old and above)

$x_2 =$ Public investment in R&D (average percentage of public investment in R&D to GDP)

$x_3 =$ Social inequality (GINI-Coefficient)

$x_4 =$ Risk to natural disasters (hazard index)

$x_5 =$ Inefficiency and ineffectiveness of using natural resources and raw materials (average percentage of export of natural resources and raw materials to total export)

$x_6 =$ Transparency in public administration (transparency index)

$\varepsilon = Error\ term$

The result from the lineal regression analysis presents similar findings as the one from descriptive analysis and binary logit regression. The human resource development, public investment in R&D, efficiently use of natural resources and raw materials and

transparency in public administration/management has significant impact on average growth rate of PPP per capita during transition period. According to the findings, the increasing average educational year of educational years of adults aging 15 years old and above every 1 year will increase the average growth rate of PPP per capita during transition period 0.45%; the increase in public investment in R&D every 1 percent of GDP will increase average growth rate of PPP per capita of 0.72%, the increasing average export ratio of export of natural resources and raw materials to total export every 1% will decline the average growth rate of PPP per capita 0.1% and the increasing transparency index of every 1 score is expected to increase the average growth rate of PPP per capita of 0.02%. More details on the analytical results are provided in the table below:

Table 6: Empirical findings from lineal regression analysis

Determinants	Coefficients	Str.Err	t	P>|t|
Average number of educational year of adults aging 15 years old and above	0,4580078	0,1824379	2,51	0,015
Public investment in R&D	0,7247351	0,4231176	1,71	0,093
Social inequality	-0,0016542	0,0310284	-0,05	0,958
Risks to natural disasters	0,3931219	0,2529696	1,55	0,126
Inefficiency and ineffectiveness of using natural resources and raw materials	-0,0116018	0,0198492	-1,69	0,09
Transparency in public administration	0,0244605	0,0146024	1,68	0,10

Observation: 60; F(6,53)=10,04, Prob>F=0,0000; R-squared=0,5320; Adj R-square=0,4791; Root MSE=1,7462

The increasing average growth rate of PPP per capita increase probability of avoiding lower middle income trap. Therefore, the results from lineal regression analysis are aligned with results from descriptive analysis and binary logit model.

IV. The Situation of Socio-Economic Development: Opportunities and Challenges for Lao PDR to Avoid Lower Middle Income Trap

Before reviewing socio-economic development and identifying opportunities and challenges to avoid lower middle income trap for Lao PDR, we would like summary the key determinants affecting lower middle income trap briefly. According to analytical findings from section above, falling in lower middle income trap can be identified as result from: (1) the country has no success in human resource development; the average educational year of adults aging 15 years old and above is relatively low; (2) limited public investment in R&D; the country has no success in development of technologies and created no innovation; (3) the country uses natural resources and raw materials inefficiently and ineffectively; (4) the country fail in public administration/management; transparency in public administration/management is low; the use of public and private budget and assets for socio-economic development is inefficient and ineffective.

Based on the key findings and real situation of socio-economic development in Lao PDR, we find that the Lao PDR has very big challenges to avoid lower middle income trap due to many reasons, particularly (1) the country still have no very big success in human resource development; the average educational year of adults aging 15 and above is still low, i.e. 5.5 years in 2013; it is lower than the average one of the countries falling in lower middle income trap (6.1 years) and much lower than the same one of countries

avoiding lower middle income trap (8.2 years); according to findings from a study from ADB, the Lao PDR can increase the average educational year of adults aging 15 years old and above 1 year in every 10 years; (2) very limited and irregular public investment in R&D; the country seems to be still far away from success in technical and technological development and innovation due to many reasons, particularly lack of high qualified and high experiencing researchers, lack of strong and leading development and research institute, lack of strong coordinating network among existing development and research institutes; (3) inefficient use of limited natural resources and raw materials; very high export rate indicates the inefficiently use of natural resources and raw materials; in 2013, the export of the resources and materials covered 66.3% of total export; it is significantly high; it is over 8 times higher than the average rate during the transition of countries of falling in lower middle income trap and over 20 times higher than the same one of countries avoiding lower middle income trap; (4) the country still have transparency problem in public administration/management; the country has significantly low transparency recently. The table below presents more details on the comparison.

Table 7: Socio-economic development of Lao PDR in comparison with countries group avoiding lower middle income trap and countries group falling into lower middle income trap

Indicators	Countries group of avoiding lower middle income trap	Countries group of falling into lower middle income trap	Lao PDR
Average educational year of adults aging 15 years old and above	8.2	6.1	5.5 (2013)
Social inequality(GINI-coefficient)	42.2	43.7	36.7 (2008)
Public investment in R&D	1.5	0.4	0.04 (2011)
Hazard index	5.4	8.1	1
Ratio of exporting natural resources and raw materials	2.7	8.6	66.3 (2010)
Transparency index/score	58.9	37.1	25 (2014)

Source: estimated by research team based on data from several sources

However, along the big challenges, the Lao PDR still has some opportunities to avoid lower middle income trap because of many reasons, particularly because of:

(1) The Lao PDR acknowledge the importance and priorities human resource development, particularly the education. Every year, the Government of Lao PDR allocates big amount of budget for the sector. For example, in fiscal year 2011-12, the GoL allocated budget of LAK 1,333 million for education sector[2], the amount presents 17% of total government budget or about 2.03% of GDP. Thus, the education sector received second biggest amount of budget, after public work and transportation. The

[2] Including official development assistance (OAD)

GoL PDR established the National Committee for Human Resource Development, chaired by Deputy Prime Minister and Minister for Education and Sport; the Minister of Labor and Social Welfare is Vice Chairman of the Committee; Vice Ministers of other Ministries are member of the Committee. Currently, the Committee is drafting the National Human Resource Development Strategy. Efficient development and implementation of the Strategy and other policies related will improve human resource development in Lao PDR, which are an important determinant accelerating and sustaining economic growth and thus avoiding lower middle income trap.

(2) The Lao PDR recognized importance and necessity of public investment in R&D. The Sciences and Technology Agency was upgraded to the Ministry of Sciences and Technologies; number of research and development institutes was established under the line ministries; the Government started to allocate some budget for R&D, etc. The increasing acknowledgement and public investment in R&D will accelerate technical and technological development and create innovation and thus will contribute to accelerate and sustain economic growth and poverty reduction and thus to avoiding lower middle income trap.

(3) The Lao PDR recognized importance of environmental protection and sustainable development, including efficiently use of natural resources and raw materials. The Government established institutional framework, coordinating mechanism and has been implementing number of policies, laws and regulations to ensure efficiently use of natural resources and raw materials; it includes upgrading Water Resources and Environmental Agency to Ministry of Natural Resource and Environment (MoNRE) taking responsibility mainly for natural resource management, approving and arranging implementation of the Environmental Protection Law, Law on Water and Water Resources, Regulation on Social and Environmental Impacts Assessment (ESIA), etc. The Government has been also promoting domestic production

and limiting export of natural resources and raw materials, etc. Systematically and strongly implementation of the policies, regulations and laws will increase efficiency in use of natural resources and raw materials, which is important determinant contributing to avoiding lower middle income trap.

(4) The Lao PDR has been implementing "Open Door" as well as regional and global integration policies, attracting in-flow of external capital, technique, technologies, high quality/high skilled human resources and etc. The in-flow will accelerate economic growth and increase opportunity for Lao PDR to avoid lower middle income trap.

(5) The Lao PDR recognized importance and established agency, mechanism, regulations and laws against corruption as well as increasing transparency in public management and administration/management. Strong and efficient State Inspection Agency will improve efficiently use of public budget and resources and thus accelerate economic growth and reduce risk of falling into lower middle income trap.

V. Policy Recommendations

Based on findings from section above, to promote sustainable economic growth and reduce risk to fall into lower middle income trap, we would like to provide following policy recommendations for Lao PDR:

(1) Enhancing human and labor force development efforts

Although the Lao PDR already recognized the importance, prioritized and has already success in the area to some certain level, the country still needs to be improved its human development a lot, particularly: (1) increasing educational and vocational network coverage to improve access and provide people better opportunities; (2) establishment of educational and vocational education and training fund; (3) improving quality and standard of education and training gradually to reach regional and global

level; (4) improving image of vocational education and training, etc. Just only by success in human and labor force development, the Lao PDR will be able to convert its natural resource based economy to knowledge and technology based one, which secures continuous and sustainable growth for long term period and thus avoiding lower middle income trap.

(2) Increasing public investment in R&D

As described above, the Lao PDR recognized importance, started to promote and achieved some success in developing its research and development system such as: the country has established number of research and development institutes under various ministries and agencies and the country started to allocate some budget for doing research and development work during last years; the Lao PDR has also has also upgraded the Science and Technology Agency to Ministry of Science and Technologies. However, research and development system in Lao PDR needs to be improved a lot, particularly: (1) establishment of the national research and development network; (2) increasing public investment in R&D; (3) enhancing role, responsibility and capacity of researchers and various research institutes; (4) development of national research strategy and action plan for supporting socio-economic development; (5) increasing regional and global cooperation for exchanging knowledge and experiences, etc. Success in R&D is key determinant contributing to industrialization and modernization and thus to avoiding lower middle income trap.

(3) Increasing efficiency and effectiveness of using natural resources and raw materials

The results from this study indicate that one of key determinants affecting lower middle income trap is inefficiently use of natural resources and raw materials. Presently, the Lao PDR recognized importance of resource efficiency and has been developing

mechanism, policy framework, regulations and laws to ensure effectively use of natural resources and raw materials such as: the country has been promoting domestic production and limiting resource export; the Lao PDR has also enacted and implemented the Environmental Protection Law prohibiting activities and investment projects having serious negative impacts on environment and natural resources, etc. However, the statistical data on export shows that the Lao PDR still has significant problem with efficiently and sustainably use of natural resource and raw materials. Therefore, the Lao PDR needs to improve its natural resources management system significantly to minimizing risks to fall in lower middle income trap, particularly (1) improvement and strengthening implementation of related policies, regulations and laws; (2) development of natural resource allocation plan; (3) promoting environmental friendly and sustainable economic activities as such: ego-tourism, etc.

(4) Developing and strengthening implementation of measures, regulations and laws related to corruption prevention and control

Transparency in public administration/management is identified as a key determinant affecting lower middle income trap. The Lao PDR has already recognized importance of transparency in public administration/management and developed institutional and legal framework to prevent and control corruption. However, the transparency index shows that the corruption prevention and control system in Lao PDR needs to be improved significantly to minimize risk to fall in lower middle income trap, particularly the Lao PDR needs strengthening and increasing coordination network of State Inspection Agency and improving implementation mechanism of laws and regulations related to corruption prevention and control, etc.

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Annexes

Annex 1: Income classification by BW and ADB in 2010

Economy	WB Class 20110	ADB Class 2010	Economy	WB Class 20110	ADB Class 2010
Afghanistan	L	L	Lesotho	LM	L
Albania	UM	LM	Liberia	L	L
Algeria	UM	LM	Libya	UM	LM
Angola	LM	L	Madagascar	L	L
Argentina	LM	H	Malawi	L	L
Australia	H	H	Malaysia	UM	UM
Austria	H	H	Mali	L	L
Bangladesh	L	L	Mauritania	LM	L
Belgium	H	H	Mauritius	UM	H
Benin	L	L	Mexico	UM	UM
Bolivia	LM	LM	Mongolia	LM	L
Bovina	LM	LM	Morocco	LM	LM
Brazil	UM	LM	Mozambique	L	LM
Bulgaria	UM	UM	Myanmar	L	LM
Burkina Faso	L	L	Namibia	UM	LM
Burundi	L	L	Nepal	L	L
Cambodia	L	LM	Netherlands	H	H
Cameroon	LM	L	New Zealand	H	H
Canada	H	H	Nicaragua	LM	L
Central African Rep	L	L	Niger	L	L
Chad	L	L	Nigeria	LM	L
Chile	UM	H	Norway	H	H
China, people's Rep.	UM	Um	Oman	H	UM
Columbia	UM	LM	Pakistan	LM	LM
Congo, Dem. Rep. of	L	L	Panama	UM	LM
Congo, Rep. of	LM	LM	Paraguay	LM	LM
Costa Rica	UM	UM	Peru	UM	LM

Cote d' lvoire	LM	L	Philippines	LM	LM
Denmark	H	H	Poland	H	UM
Dominican Republic	UM	LM	Portugal	H	H
Ecuador	UM	LM	Qatar	H	H
Egypt	LM	LM	Rep. of Korea	H	H
El Salvador	LM	LM	Romania	UM	LM
Eritrea	L	L	Rwanda	L	L
Finland	H	H	Saudi Arabia	H	UM
France	H	H	Senegal	LM	L
Gabon	UM	LM	Sierra Leone	L	L
Gambia	L	L	Singapore	H	H
Germany	H	H	South Africa	UM	LM
Ghana	LM	L	Spain	H	H
Greece	H	H	Sri Lanka	LM	LM
Guatemala	LM	LM	Sudan	LM	L
Guinea	L	L	Swaziland	LM	LM
Guinea Bissau	L	L	Sweden	H	H
Haiti	L	L	Switzerland	H	H
Honduras	LM	LM	Syrian Arab Republic	LM	UM
Hong Kong, china	H	H	Taipei, China	H	H
Hungary	H	UM	Tanzania	L	L
India	LM	LM	Thailand	UM	UM
Indonesia	LM	LM	Togo	L	L
Iran	UM	LM	Tunisia	UM	LM
Iraq	LM*	L	Turkey	UM	UM
Ireland	H	H	Uganda	L	L
Israel	H	H	United Arab Emirates	H	H
Italy	H	H	United Kingdom	H	H
Jamaica	UM	LM	United States	H	H
Japan	H	H	Uruguay	UM	UM
Jordan	UM	LM	Venezuela	UM	UM
Kenya	L	L	Viet Nam	LM	LM
Kuwait	H	H	Yemen, Rep	LM	LM
Lao PDR	LM	L	Zambia	LM	L
Lebanon	UM	LM	Zimbabwe	L	L

Annex 2: List of countries entering into lower middle income status after 1950 and transiting into upper middle income status

Countries	Region	Year of entering into lower middle income status	Year of transition	Number of transition years	Average PPP per capita during transition period
RPC	Asian	1992	2009	17	7.5
South-Korea	Asian	1969	1988	19	7.1
Taiwan	Asian	1967	1986	19	7
Malaysia	Asian	1969	1996	27	5.1
Thailand	Asian	1976	2004	28	4.7
Oman	Middle-East	1968	2001	33	2.7
Turkey	Europe	1955	2005	50	2.6
Bulgaria	Europe	1953	2006	53	2.5
Costa Rica	Latin-American	1952	2006	54	2.4

Annex 3: List of countries transiting to high income status after 1950

Countries	Regions	Year of entering into upper middle income status	Year of transition	Number of transition years	Average PPP per capita during transition period
Hong Kong, China	Asian	1976	1983	7	5.9
South-Korea	Asian	1988	1995	7	6.5
Taiwan, China	Asian	1986	1993	7	6.9
Japan	Asian	1968	1977	9	4.7
Singapore	Asian	1978	1988	10	5.1
France	Europe	1960	1971	11	4.4
Austria	Europe	1964	1976	12	4.1
Belgium	Europe	1961	1973	12	4.4
Mauritius	Africa	1991	2003	12	4
Germany	Europe	1960	1973	13	3.4
Chile	Latin-America	1992	2005	13	3.7

Norway	Europe	1961	1975	14	3.5
Sweden	Europe	1954	1968	14	3.6
Denmark	Europe	1953	1968	15	3.3
Finland	Europe	1964	1979	15	3.6
Ireland	Europe	1975	1990	15	3.2
Italy	Europe	1963	1978	15	3.4
Netherland	Europe	1955	1970	15	3.3
Spain	Europe	1973	1990	17	2.7
Israel	Middle-East	1969	1986	17	2.6
Portugal	Europe	1978	1996	18	2.8
Greece	Europe	1972	2000	28	1.8
Argentina	Latin-America	1970	2010	40	1.2

Annex 4: List of countries falling in lower and upper middle income trap in 2010

Countries	Regions	PPP per capita at 1990 constant price	Number of years in the status	Average growth of PPP per capita from 2000-2010	Expected transition year
I. Countries falling in lower middle income trap					
Philippines	Asian	3,054	34	2.5	35
Sri Lanka	Asian	5,459	48	4.3	7
Albania	Latin-America	4,392	37	4.8	11
Romania	Latin-America	4,507	49	4.1	12
Bolivia	Latin-America	3,065	45	1.8	49
Brazil	Latin-America	6,737	53	2	4
Colombia	Latin-America	6,542	61	2.6	5
Dominican Rep	Latin-America	4,802	38	2.8	15
Ecuador	Latin-America	4,010	58	2.2	27
El Salvador	Latin-America	2,818	47	0.4	251
Guatemala	Latin-America	4,381	60	1.1	47
Jamaica	Latin-America	3,484	56	-0.3	NA
Panama	Latin-America	7,146	56	2.4	1

Paraguay	Latin-America	3,510	38	1.5	48
Peru	Latin-America	5,733	61	4.2	6
Algeria	Latin-America	3,552	42	2.2	34
Egypt	Latin-America	3,936	31	3	21
Iran	Latin-America	6,789	52	3.4	2
Jordan	Latin-America	5,752	55	3.5	7
Lebanon	Middle-East	5,061	58	4.1	10
Libya	Middle-East	2,924	43	2.4	39
Morocco	Middle-East	3,672	34	3.3	21
Tunisia	Middle-East	6,389	39	3.5	4
Yemen, Rep	Middle-East	2,852	35	0.9	109
Botswana	Africa	4,858	28	1.7	24
Congo, Rep	Africa	2,391	33	1.8	63
Gabon	Africa	3,858	56	0	NA
Namibia	Africa	4,655	61	2.4	19
South Africa	Africa	4,725	61	2	23
Swaziland	Africa	3,270	41	2.2	37
II. Countries falling in upper middle income trap					
Malaysia	Asian	10,567	15	2.6	5
Uruguay	Latin-America	10,934	15	3.3	3
Venezuela	Latin-America	9,662	60	1.4	15
Saudi Arabia	Latin-America	8,396	32	0.9	37
Syria	Latin-America	8,717	15	1.7	18

Annex 5: List of countries being in transition period from lower to upper middle income and from upper middle to high income status in 2010

Countries	Regions	PPP per capita at 1990 constant price	Number of years being in the status	Number of years remained before falling in middle income trap	Average growth of PPP per capita from 2000-2010
I. lower middle income countries					
Cambodia	Asian	2,529	6	22	8.2
India	Asian	3,407	9	19	6.1
Indonesia	Asian	4,790	25	3	3.9
Myanmar	Asian	3,301	7	21	9
Pakistan	Asian	2,344	6	22	2.6
Vietnam	Asian	3,262	9	19	6.1
Honduras	Latin-America	2,247	11	17	1.6
Mozambique	Africa	2,362	4	24	5.8
II. Upper middle income countries					
China	Asian	8,019	2	12	8.9
Thailand	Asian	9,143	7	7	3.6
Bulgaria	Europe	8,497	5	9	4.7
Hungary	Europe	9,000	10	4	2.4
Poland	Europe	10,731	11	3	3.9
Turkey	Europe	8,123	6	8	2.3
Costa Rica	Latin-America	8,207	5	9	2.9
Mexico	Latin-America	7,763	8	6	0.7
Oman	Middle-East	8,202	10	4	1.4